Balancing climate and development goals

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The impact on climate change would only be modest if countries in the process of development were to delay efforts to reduce their carbon emissions until they reach a certain level of economic growth.

That is the key finding in a new study published today in *Environmental Research Letters* by scientists from the Carnegie Institution for Science,

U.S. and the University of Waterloo, Canada.

The study explores the climate consequences that would emerge should developing countries reach a specific per-capita GDP level before they start to focus their efforts on reducing carbon emissions. Using historical records of CO_2 emissions combined with gross domestic product (GDP) and population data from the World Bank, scientists Lei Duan and Ken Caldeira from the Carnegie Institution for Science with Juan Moreno-Cruz from the University of Waterloo, created a wide range of future scenarios in which CO_2 emissions increase according to historical trends and then start to decline only when countries reach a specified income level.

Lei Duan from the Carnegie Institution for Science said: "Decarbonisation is not often the priority for less developed countries, at least not compared to ensuring economic growth and provision of energy services. As these countries work their way towards prosperity, they need to strike a balance between climate and development goals. But if developing countries wait to adopt measures to reduce their CO_2 emissions, we need to know what the climate implications of that would be."

The study found that if countries were to begin to decarbonise when per-capita GDP exceeded $10,000, there would be less than 0.3°C of additional warming. If countries above that GDP level reduce emissions at a rate of 2% each year, the delay in decarbonisation from developing countries would represent only an estimated 6% between 2020 and 2100 to total cumulative CO_2 emissions.

Juan Moreno-Cruz from the University of Waterloo said: "Over half the world's population currently lives in countries below an income threshold of $10,000, yet our study shows that a lack of participation in decarbonisation amongst these countries would have relatively little

impact on the global temperature change."

However, the paper warns that lock-ins into long-term emission emitting technologies must be avoided. "The challenge is to make sure fossil fuel investments made today do not create an infrastructure or political constituency that would make a low-carbon future infeasible." Ken Caldeira from the Carnegie Institution for Science explains. "The risk is that less-developed countries become addicted to fossil-fuelled development and find the habit hard to kick as they become more wealthy. Near-term energy system investments must address near-term needs, but must take place in the context of the longer-term development of a modern low carbon-emission economy."

Lei Duan goes on to say: "We recognise that all countries need to work together to achieve the Paris agreement ambitions of holding temperature rises to no more than 2°C above pre-industrial levels, with an aspiration of a 1.5C limit. But this study shows, across a wide range of scenarios and assumptions, that the greater impact will come from middle and high income countries' decarbonisation."

More information: Lei Duan et al, Balancing climate and development goals, *Environmental Research Letters* (2020). DOI: 10.1088/1748-9326/abbe46

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